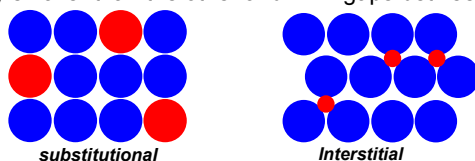


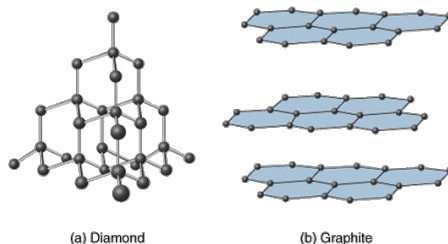
## Assignment 10.2

## Questions 17, 24a, 55, 57, 71, 72, 111

- 17) An alloy is a homogeneous mixture of elements with metallic properties. Substitutional alloys have similar atomic radii and atoms of one metal simply replace the other. With interstitial alloys, atoms of one metal are significantly smaller than the other and fill in gaps between atoms.



- 24a) In graphite, the carbon atoms are bonded in sheets of hexagonal structures. These sheets can easily slide past one another, thus graphite is soft (pencil lead). In diamond, the network solid has a tetrahedral structure that forms strong covalent bonds in all three dimensions, making the network very strong.



- 55) When phosphorus is added to the silicon alloy, it provides extra electrons to the silicon network, making it an n-type (negative-type) semiconductor. This makes it a better conductor of electricity.

When gallium is added to a silicon alloy, it removes an electron from silicon, making it a p-type (positive-type) semiconductor. This makes the alloy a better conductor, because the "hole" where the electron is missing, travels through the network.

- 57) Indium has 3 fewer valence electrons than selenium, so it would make a p-type semiconductor.

- |                                    |  |  |
|------------------------------------|--|--|
| 71) a. CO <sub>2</sub> : molecular | e. Ru: atomic, metallic                    | i. NaOH: ionic   |
| b. SiO <sub>2</sub> : network      | f. I <sub>2</sub> : molecular              | j. U: atomic, metallic                                       |
| c. Si: atomic, network             | g. KBr: ionic                              | k. CaCO <sub>3</sub> : ionic                                 |
| d. CH <sub>4</sub> : molecular     | h. H <sub>2</sub> O: molecular             | l. PH <sub>3</sub> : molecular                               |
| 72) a. diamond: atomic, network    | e. KCl: ionic                              | i. Ar: molecular   |
| b. PH <sub>3</sub> : molecular     | f. quartz: network                         | j. Cu: atomic, metallic                                      |
| c. H <sub>2</sub> : molecular      | g. NH <sub>4</sub> NO <sub>3</sub> : ionic | k. C <sub>6</sub> H <sub>12</sub> O <sub>6</sub> : molecular |
| d. Mg: atomic, metallic            | h. SF <sub>2</sub> : molecular             |  |

- 111) The metal chlorides and fluorides have ionic bonds, which are stronger, so they have higher melting points. The molecular compounds have much lower MPs.

The fluorides have somewhat higher MPs because the bonds are more ionic.

- An exception is AlCl<sub>3</sub>, which has a much lower MP than AlF<sub>3</sub>. This is because of the smaller difference in electronegativity. It has a lower ionic character.